PAPER ID-411123

Subject Code: KCA205

Roll No: | | | | | | | | | | | | | |

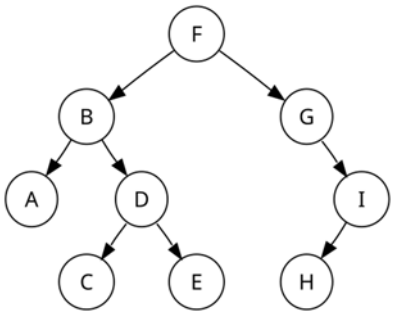
MCA
(SEM II) THEORY EXAMINATION 2023-24
DATA STRUCTURES & ANALYSIS OF ALGORITHMS

TIME: 3 HRS **M.MARKS: 100**

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 10 = 20**

Q no.	Question	Marks	CO
a.	Define algorithm. Give its characteristics.	02	1
b.	What is header linked list?	02	1
c.	Define recursion.	02	2
d.	What is priority queue?	02	2
e.	Traverse a given tree in Pre-order traversal. 	02	3
f.	Define Threaded binary tree.	02	3
g.	Define fully connected graph.	02	4
h.	What is weighted graph?	02	4
i.	Apply Quick sort algorithm on the string : D, E, L, H, I	02	5
j.	What is minimum spanning tree (MST)?	02	5

SECTION B

2. Attempt any *three* of the following: **3 x 10 = 30**

Q no.	Question	Marks	CO
a.	How polynomials can be represented using linked list? Write a function/algorithm to add two polynomials.	10	1
b.	What is hashing? How can we define hash function?	10	2
c.	Define binary search tree. Create a binary search tree by inserting following keys: 9, 2, 3, 4, 5, 6, 8, 1, 7, 0	10	3
d.	What is the divide and conquer problem solving strategy? How binary search algorithm follows this approach?	10	4
e.	Given two strings, find the Longest Common Subsequence (LCS), present in both of the strings. String-1=ASDFGHJK String-2=SHJLU	10	5

SECTION C

3. Attempt any *one* part of the following: **1 x 10 = 10**

Q no.	Question	Marks	CO
a.	Define linked list. Write a function in C to create a singly linked list.	10	1
b.	What is sparse matrix? How it can be represented using header linked list.	10	1

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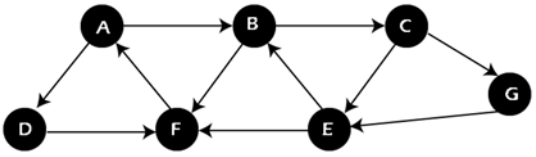
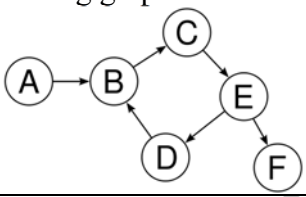
4. Attempt any *one* part of the following: 1 x 10 = 10

Q no.	Question	Marks	CO
a.	Give applications of stack. Write an algorithm to evaluate postfix expression.	10	2
b.	Define linear queue. Write a program or algorithm to implement linear queue.	10	2

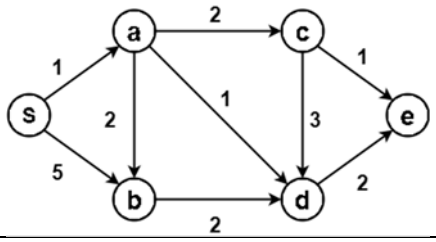
5. Attempt any *one* part of the following: 1 x 10 = 10

Q no.	Question	Marks	CO
a.	Define AVL tree. Demonstrate LL, RR, LR, RL rotations of AVL tree with suitable examples.	10	3
b.	Write the properties of B-Tree. Insert the following keys in a B-Tree of order 3: 98, 76, 54, 32, 12, 34, 56, 78, 95, 48	10	3

6. Attempt any *one* part of the following: 1 x 10 = 10

Q no.	Question	Marks	CO
a.	What is breadth first search (BFS) algorithm for traversing a graph? Apply BFS in the given graph, assuming vertex A as starting vertex. 	10	4
b.	Differentiate between Graph and Tree. Give adjacency matrix representation of the following graph. 	10	4

7. Attempt any *one* part of the following: 1 x 10 = 10

Q no.	Question	Marks	CO
a.	Write a program in C to implement merge sort. Give its time and space complexity.	10	5
b.	Find the shortest paths from the source to all the other vertices in the given graph using Dijkstra's algorithm. Assume source vertex as S. 	10	5

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